Attachment 13

FUTURE TACTICAL TRUCK SYSTEM (FTTS)

ADVANCED COLLABORATIVE ENVIRONMENT (ACE)

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Table of Contents

1. Overview

The Future Tactical Truck System ACTD has established very aggressive performance goals for cost and schedule. The Advanced Collaborative Environment is a major element of the Army's tactics to achieve those performance goals.

ACE provides a complete distributed data repository with numerous levels of access control along with a collaborative environment that enables real time decision-making relative to program deliverables. It is the Army's intent to have ACE as a key contributor in making the best possible decisions throughout the Program life cycle and that is predicated on availability of full information to all team members involved in the making of those program decisions. The FTTS ACTD will use ACE to facilitate effective feedback, efficient change management, and rapid change propagation. ACE will support a wide variety of uses. Some of these include: support for IPR's, minor and major design reviews, linking with potential users of the systems, distributed team meetings, issue recording, etc.

The Tank-automotive Research, Development and Engineering Center (TARDEC) National Automotive Center's Advanced Collaborative Environment Group is responsible for implementing the FTTS ACE environment and has done so using a suite of commercial-off-the-shelf licensed software tools developed by Parametric Technology Corporation (PTC) consisting of several products from the Windchill® family to including Windchill Foundation® and Windchill ProjectLink® as the core elements of the solution. For more information regarding FTTS ACE License requirements, see Section 12 - FTTS ACE Access & Licensing. An FTTS ACE IPT manages authorization and authentication. Access control policies are developed and maintained by the ACE IPT, executed by the Government sites/contractors, and can be applied at the individual object level. All Government sites and subcontractors will be provided ACE licenses and will use the system as a collaboration tool with the FTTS ACTD and as a source of all relevant data.

Upon obtaining the ACE licenses, TARDEC and Parametric Technology Corporation can provide role-based training assistance with the core elements of the solution – Windchill Foundation® and Windchill ProjectLink ®. Tip sheets and FAQ documents will be made available on the FTTS ACE Home Page. TARDEC and PTC can help to determine what tip sheets and FAQ's are most relevant to the specific role played by ACE team members. In addition, TARDEC and PTC will work with the individual team members using ACE to determine what other training is necessary to most effectively work with this collaborative environment.

2. FTTS Advanced Collaborative Environment (ACE)

The FTTS Advanced Collaborative Environment (ACE) is a comprehensive collaborative environment designed to successfully leverage Simulation Modeling for Acquisition, Requirements and Training (SMART) processes to reduce costs, schedule, and performance risks associated with the FTTS acquisition strategy. For the FTTS ACTD, the Collaborative Environment is defined as a collection of software tools and methodologies, authoritative data, and services that enable information exchange so that stakeholders can coordinate, communicate and work jointly together across organizational and geographical boundaries to execute their activities in an integrated and effective manner. The FTTS ACE is the hub of the SMART approach, providing the tools, access mechanisms, and the single source of the product description, to coordinate activities. The FTTS ACE will interconnect all functional discipline stakeholders (e.g. system engineers, technology providers, and analysis/assessment teams-both contractor and Government) and their tools/data sets. The ACE enables the FTTS team to operate efficiently by providing all program personnel with real-time collaborative access to a single source of management information and product and technical data.

The FTTS ACE is an information/collaboration environment that provides controlled access to all program and product information, both released and in work, and work flows relevant to FTTS. Data types run the gamut from geometry to business management elements. Historical data relating to that information and multiple levels of access control and security are key parts of FTTS ACE. The collaboration aspects allow focused tasks to be isolated (data and invited participants) from the larger project and worked on through threaded discussions, local actions, and in work files. At all times historical information is maintained allowing for complete auditing trails.

The FTTS ACE can be described as a mechanism that connects five primary components, such that they work together to provide maximum value to the FTTS program. These primary components include 1) the M&S Tools; 2) Design, Engineering, and Manufacturing Development Tools; 3) a Product Description; 4) the Collaborative Library/Repository; and 5) the Collaborative Project Environment.

3. Interface To/From Modeling and Simulation Tools

ACE supports the set of M&S tools that support exploratory analysis, experimentation, concept and design assessments, tactics development and other activities. In turn, these tools will assist in acquiring data and information representing the concepts and designs through the FTTS-ACE product description. The M&S tools include constructive and virtual simulations that range from engineering level to force on force, reconfigurable simulators, emulators, stimulators, man-in-the-loop, hardware-in-the-loop, etc.

The following list provides example capabilities related to modeling and simulation tools:

- Ability to manage modeling and simulation (M&S) inputs, results, and models – this is not a simulation execution environment

- On-line planning, tasking, monitoring, synchronizing of M&S Events

- Streamline data preparation & accreditation

- Configuration Management of Models

- Fast delivery of output in useful form

- Traceability from requirements to decisions

4. Interface To/From Design, Engineering, and Manufacturing Development Tools

Using workflow services and version control, the FTTS ACE manages the life cycle of data objects from initial concept definition through Army review, verification, and certification. This information will populate the Product Description data. The configuration management (CM) process and visibility of in-process data supports a proven, share early, share often philosophy. This approach encourages collaboration early in the design life cycle, reducing errors and producing higher quality products. The FTTS ACE toolset includes visualization services to support 2D and 3D viewing of models from multiple

authoring tools, with on-screen collaborative review and markup capabilities at the stakeholders' desktop computer.

The following list provides example capabilities related to engineering, manufacturing and development tools:

- Interface to Computer Aided Design Tools – Mechanical CAD and Electrical CAD applications for managing and viewing data.

- Ability to manage CAD data (MCAD and ECAD)

- Ability to visualize CAD data in a light weight viewer

- Computer Aided Software Engineering (CASE) Tools and data

- Ability to manage software modules and builds.

- Ability to manage multiple builds.

5. Desk Top Tools

The planned use of desktop tools is to provide the stakeholder with the information and software applications at their desktop to permit the viewing and use of: product description information, library resources, project workspace and management information.

5.1 Workflows within FTTS ACE

The FTTS ACE is used to implement processes on the FTTS Program. Document Release, Change Management, Configuration Management, Export Control, Proposal Review, and FTTS ACE Account Processing are some of the workflows that will be implemented. The workflows guarantee that all responsible parties have been contacted and the appropriate approvals have been received prior to completion of any of the above activities. The FTTS ACE team works closely with the organization assigned the process in establishing the flow.

5.2 FTTS ACE Change Management

The FTTS ACE team will establish an internal change process for modifications to the system. Change requests are written, reviewed, and prioritized. Changes are brought to the attention of the FTTS ACE IPT in a variety of ways; bug fixes identified by the FTTS ACE team, direct contact with the IPT focal points, and notification through the FTTS ACE portal, planned updates to the system capability, or new capability at the direction of Program Management. Changes required in the COTS software are sent to the vendor. Internally controlled actions are scoped, scheduled, and identified for a future block point release. All changes are thoroughly tested in our test environment prior to implementation.

5.3 Program Management Tools

The Advanced Collaborative Environment contains Program Management applications and data. Tools to support Risk Management, Action Items, Technical Performance Measures, Cost, Schedules, and Earned Value Management will be accessible through the FTTS ACE portal. Each tool will have its own authentication and access controls.

6. Product Description

The Product Description represents vendor developed FTTS concepts, designs, product models, and simulations. The Product Description is envisioned to provide a single, application-neutral, logically unified representation (product structure) that comprises physically distributed systems (that may be composed of data from physically distributed servers) using original source data, controlled replication of data from the authoring source, or federated data using proxy objects. The Product Description will provide several views of information to support a full range of program activities: 1) a logical flow of documents between organizations and phases, 2) a physical view describing models and their characteristics, 3) a performance view describing model behaviors, 4) an interface view describing model relationships, and 5) configuration management, search and notification for the data in the above views.

6.1 Product Description Design

The Product Description is designed using standard object-oriented methodologies to capture data and the Unified Modeling Language (UML) to model processes. Logical and physical models are being developed and used by the IPT's to support information evolution and process automation. The models include the metadata required to support data indexing, retrieval, and reuse.

The Product Description approach is based on multi-variate, multi-source product data management experience and other lessons learned from commercial and defense programs. The FTTS team has an existing process to establish data federation options and minimize replication when data is not available due to firewalls or other reasons. Data interchange formats (DIF) are employed to accelerate Product Description data translation for use by multiple tools and applications.

6.2 Product Description Content

The Product Description includes data representing the FTTS concepts and designs, including relationship mapping between data objects, models, simulations, and assessment results. The Product Description is populated with released data from source tools and applications. Workflow services are used to enable Army review and certification of data before population into the Product Description.

6.3   PD CM and Access Procedures

The Product Description is the authoritative source for configuration managed, verified, and certified data representing FTTS concepts, designs, models, and simulations. Effective use of the Product Description ensures coherent, consistent access to the latest authoritative information, minimizing errors caused by working from out-of-date or inconsistent data. Users do not need to know where specific data resides; the global search and integration capabilities of the ACE make this transparent to the user.

Data in the Product Description can be either stable or dynamic. Stable data are normally context-independent despite external environment changes. Examples of stable data are requirements (between versions), structural elements characteristics, electrical power demand, and cost factors. Dynamic data are relative to external environments and often change. Examples of dynamic data are design trades, visual appearance as a function of ambient light, loss/exchange ratio, probability of detection, and performance results as a function of mission, weather, tactics, or operator proficiency. Modeling and simulation are the usual method for developing context-dependent data.

Stable data submitted to the Product Description are revision controlled with review and approval workflows before release. Best practice CM procedures, which include tracking of version releases and updates to ensure coherency and consistency of Product Description data products, will be followed. The control, management, and storage of dynamic data are much more difficult. Best practice CM procedures for dynamic data will include requiring metadata documentation for "operational context"; documentation of aggregation, pre-processing, and post-processing methods; and any other documentation necessary for logical consistency, change propagation, and traceability.

For modeling and simulation execution and analysis, the ACE will provide users the capability to review Product Description data that are contained in input and output files at modeling and simulation execution sites.

Product Description Support to FTTS-Activities supported by the Product Description include but are not limited to: Army reviews of vendor design concepts; visual inspection of 3D virtual prototypes; execution of M&S; review & comparisons of M&S results for verification and validation (V&V); preparation of authoritative FTTS representations for external assessments; preparation of prototype representations for training & external M&S use; capture & review of M&S experiment outcomes and test results; projection of Measures of Performance (MOP's) and Measures of Effectiveness (MOE's) based on M&S and test results; comparison of MOPs, MOEs, and cost projections vs. requirements; evaluation of alternative designs vs. requirements and priorities; systems engineering analyses; engineering design analyses (using CAE/CAD/CAM/CASE tools); hardware/software integration analyses (internal

subsystems); interoperability analyses (external systems), design-driven test plan development & scheduling, and CM of designs.

6.4　Product Description Evolution and Growth

The Product Description design and content evolve throughout the program life cycle, driven by changing program activities, data maturation, and technology insertion. IPTs work with the ACE IPT to continuously improve the Product Description based on changing requirements. The ACE change board approves all changes to the Product Description structure and data model, with Army board members having final decision authority.

7. Collaborative Library/Repository

The Collaborative Library/Repository maintains all released FTTS information from the FTTS integrated product teams to include documents, drawings, etc. In addition, it includes information and data from outside sources (non-FTTS programs) brought into the FTTS program for use. The Government M&S Tools as well as the Design Tools draw information from the FTTS Collaborative Library/Repository, the authoritative collection of non-FTTS blue system data and models, red system data and models, scenario databases, and environmental databases. As the distinction between the Product Description and the FTTS Collaborative Library/Repository is accountability for management and responsibility (e.g., originator). The data structure will be similar even though the FTTS Collaborative Library/Repository will have broader coverage.

8.   Collaborative Project Environment

The Collaborative Project Environment is a virtual central component of the ACE. It provides security, applications integration, and core services to: (1) navigate for information, (2) collaborate on shared content within IPT's and access remote applications throughout the ACE, (3) configuration manage all authoritative content and business processes that are shared by the FTTS user community, and (4) distributed meetings over the internet. It is the foundation that ensures that all FTTS program-related personnel can access needed information while protecting proprietary and export-controlled data.

Included in the Windchill suite of software are two COTS-based application frameworks: Windchill Foundation® and Windchill ProjectLink®. Windchill Foundation® provides the library function with a sharable set of common applications and services for product and business object life-cycle management that allows integration of business processes and product data within dispersed government agencies and industrial partners. Windchill ProjectLink® provides the project management function with a set of collaboration management and applications that facilitates project, document, and product collaboration.

The basic tenets of the FTTS Collaborative Library/Repository are fundamentally to provide data storage locations that will serve as the single authoritative source for their respective configuration managed, certified data. The Windchill® Foundation and Windchill® ProjectLink applications and supporting infrastructure ensures the integrity and authoritative ownership management for the FTTS Collaborative Library/Repository content/object management throughout the lifecycle of the FTTS ACTD.

9. FTTS ACE Development and Deployment

The FTTS ACE architecture, combined with internal and external process inputs and outputs, data interfaces, and business rules, is used to create the information and application architectures, describing process and tool interfaces for each functional area. Using standard DIF's, such as the standard for the exchange of product model data (STEP) and Extensible Markup Language (XML), the ACE enables secure and easy information access, with minimal configuration and integration complexity.

9.1 FTTS ACE Security Provisions

The FTTS ACE security services use role-based access controls to ensure that all program personnel, regardless of location, can access needed information while protecting proprietary and export-controlled data. The security services use industry standard LDAP directory services and X.509 certificates with a FTTS enterprise public key infrastructure (PKI). No data classified at levels above collateral Secret will be incorporated in the ACE. Any such data required within the FTTS program will be handled separately in accordance with the approved security plan.

10.   User Interface With the ACE

Using a standard web browser, the user accesses the ACE portal. All of the
FTTS ACE navigation applications are web based, providing a feature-rich, user-
friendly information portal, requiring no special software or further investment for
desktop installation or user training. In addition to enhanced information
navigation and search features, the FTTS ACE provides viewing tools that allow
users to review, manipulate, and mark up 2D and 3D models without the need for
expensive applications or associated training. Data storage locations are
transparent to the user.

11.   FTTS ACE- Now and the Future

Many FTTS ACE components already exist, but are not yet fully integrated to enable maximum collaboration. The process of achieving the level of integration needed for full collaboration is rapid and iterative, with a strategy of building collaborative capabilities and culture from the ground up. As new interfaces are developed and matured, advantages will include:

  •Rapid exploration of alternative designs and solutions

  •Soldier assessment and review of human features, workload, and interfaces during design stages

  •Test and evaluation of digital representation of systems conducted in a virtual environment with results viewed immediately

  •Development of training, manufacturing, and supportability considerations in the same digital environment as the engineering design

  •Understanding of operational scenarios for mission rehearsals and potential for updating existing training simulations to benefit training opportunities

  •Reduction in number of face-to-face meetings and associated travel costs

As the program evolves the FTTS ACE functionality will also expand and evolve. The system is designed to allow growth without impact to current users. The FTTS ACE has been designed to allow incorporation of new emerging technologies. The FTTS ACE will support the knowledge management needs for data fusion, data mining, and decision aid capabilities as they reach usable technology readiness levels.

Since the FTTS ACE runs as an application on a standard network, it is deployable on local area networks (LANs) and can be deployed into the field.

12.   FTTS ACE Access & Licensing

12.1 FTTS ACE ACCESS

Is it required for my company or organization to access the FTTS ACE?

Yes. All suppliers are required to deliver and access data within the FTTS ACE. The FTTS program is committed to realizing the benefits of an FTTS ACE environment. Critical to realizing those benefits is embracing the FTTS ACE by all stakeholders.

How do I access the FTTS ACE?

The FTTS ACE is accessed by obtaining an FTTS ACE License as well as an access account from the Army. This appendix describes the process of obtaining both licenses and accounts. The FTTS ACE is an information portal that provides navigation services that are web based. This feature-rich, user-friendly information portal requires no desktop installation and minimal user training. In addition to enhanced information navigation and search features, the FTTS ACE provides viewing tools that allow users to review, manipulate, and mark up 2D and 3D models without the need for expensive applications or associated training.

How does access to the FTTS ACE help me as a supplier?

It is the way that all participants in the FCS Program will collaborate on this massive undertaking – just like people use email as an electronic data transfer device today. While email is simply an electronic transfer device, the suite of software within the FTTS ACE provides capabilities for sharing, collaborating and protecting information unavailable in other software products. It is the way that all distributed FTTS constituents will communicate and collaborate moving forward. As a potential stakeholder in the FTTS Program, the FTTS ACE is your information conduit to find current information relevant to your deliverables as well as to share information and deliverables with other stakeholders. The benefits of utilizing the FTTS ACE are to reduce overall costs through more efficient management of data and information, improve control and visibility of the overall program and reduce performance risk by compressing the schedule of collective deliverables.

12.1 FTTS ACE ACCESS

What is the FTTS ACE License for?

The FTTS ACE License enables the account holder to access the FTTS ACE web environment that contains services for collaboration, document

management, process automation, configuration management, and others to be used by all the FTTS stakeholders to mature Program data.

If I recieve FTTS ACE licenses, will I have access to all the data and information in the FTTS ACE?

Access to the FTTS ACE does not permit unlimited access to all data in the FTTS ACE environment. The nature of any FTTS ACE is to protect sensitive Intellectual Property and comply with export regulations for Technical Data. License holders will have access to projects they are invited to attend and collaborate. They will also be able to initiate projects and control access by other FTTS ACE account holders. Data intended for Program wide distribution will be available for all FTTS ACE account holders.

Why do I need to receive more than one license to access the FTTS ACE?

Anyone involved in the collaboration process must have his or her own user ID and password. This is required for security control, data sharing, process involvement and proper notification flow.

How many licenses must I have relative to the size of my internal FTTS team?

The FTTS Program is significantly committed to realizing the returns offered by the FTTS ACE environment when all stakeholders are fully engaged. This translates into the need to provide access for each participant from each stakeholder company into the FTTS ACE environment. The number of licenses required would depend upon how many persons from your company will be actually in collaboration with the individual IPTs and/or the FTTS Program, up to a total of 20. Any amount over 20 would be up of negotiation. It is feasible this could be limited to a select group of Contracts Persons and IPT leads. Depending upon the size of the effort and need to collaborate, your company may require many more users. Over time, it is anticipated that the trend will necessitate more users having access to the FTTS ACE.

How many FTTS ACE Licenses are required?

All persons accessing and collaborating with the FTTS ACE are required to have an FTTS ACE License. FTTS ACE licenses cannot be shared amongst individual users.

Who needs to have a license?

Each organization must assess their participation to determine the number of personnel who will need access. As guidance, any individual that contributes to the process of defining, collaborating, reviewing, and delivering contributions to the FTTS program will need an FTTS ACE License. This includes both inter-company and intra-company collaborative activities. To start, Contracts Persons

and IPT Leads should have licenses. Over time, typical users will include many of the following persons involved in collaboration:

1. IPT Leads

2. Contracts Persons

3. IPT Members

4. Procurement & Supplier Management Personnel

5. Engineers

6. Sales, Marketing & Business Development Personnel

7. IT Personnel

8. Manufacturing & Assembly Personnel

9. Administration

10. Simulation, Testing & Analysis Engineers

Who do I contact to obtain FTTS ACE Licenses?

12.2   COMPUTING REQUIREMENTS

What operating system do I need to run the software?

Windows NT or Windows 2000 and the UNIX versions of HP, IBM or Sun.

What additional software do I need to run the software?

Your web browser will need to be Netscape Navigator 4.7.x or 6.2.x or Microsoft Internet Explorer 5.5 SP2 and higher.

12.2   FTTS ACE TRAINING

How can I learn how to use the FTTS ACE Windchill software suite?

Upon obtaining the FTTS ACE licenses, role-based training assistance with the core elements of the solution – Windchill Foundation® and Windchill ProjectLink® will be provided . There are many tip sheets and Frequently Asked Questions (FAQ) documents that will be available on the FTTS ACE Home Page. This basic training will be provided at no charge for FTTS ACE license holders.